

research snapshot

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Prenatal Alcohol Exposure Increases the Course and Severity of Adjuvant-Induced Arthritis

What is this research about?

Prenatal alcohol exposure (PAE) affects the development of many systems in the body. These include the neuroendocrine system and the immune system. These systems regulate many processes such as digestion, energy, mood and emotions. Impairments in immune function are shown in individuals prenatally exposed to alcohol. For example, individuals with PAE experience a greater number of major and minor infections and increases in some forms of cancer.

What did the researchers do?

The study used an animal (rat) model of PAE to look at immune function by studying animals with arthritis. An adjuvant-induced arthritis (AA) model was used for this study. AA is commonly used as a model of rheumatoid arthritis (RA) in humans. Pregnant females were given an alcohol-containing diet or a control diet, without alcohol, throughout pregnancy, and their female offspring were used in the study.

The researchers wanted to know if PAE would increase the inflammatory response and result in a greater severity of AA. The appearance of AA, as well as immune markers and hormone levels

What you need to know:

Previous research on children with FASD and on animal models of FASD has shown changes in immune function. This is the first study to show the effect of prenatal alcohol exposure on the development and severity of arthritis in adulthood. These new findings provide insight on the possible mechanisms underlying the adverse effects of alcohol on immune capability.

were assessed over the course of inflammation. Arthritis was induced by injecting complete Freund's adjuvant (CFA). This substance induces inflammation, primarily in the joints of the hind paws. Inflammation in each paw was scored on a scale of 0 (no sign of arthritis) to 4 (severe overall swelling). When they were doing the scoring, the researchers were unaware of which treatment the rats had received.

What did the researchers find?

PAE alters the course and severity of AA in adulthood. Female rats with PAE had a higher occurrence of arthritis and a longer course of inflammation than control females. Fewer control females developed arthritis after CFA injection, and most of them recovered completely. By contrast, many more females

with PAE developed arthritis. Approximately 50% of them had not recovered by the end of the study (39 days post-injection). In addition, females with PAE had increased baseline levels of stress hormones 7 days after CFA injection, before there were any clinical signs of arthritis. However, hormone levels then decreased and matched levels of the control group by the end of the study.

The effects of PAE on the length and severity of AA in adulthood show an important long-term change in functional immune status. Pro-inflammatory changes may have serious consequences for vulnerability to stress- or immune-related disorders later in life. PAE may also have both direct and indirect effects on chronic inflammatory processes. That is, PAE may directly affect immune/inflammatory processes, and indirectly affect inflammation through effects on the stress hormones.

How can you use this research?

Environmental factors, such as exposure to early life stress or to toxic substances such as alcohol or other drugs, are known to affect many systems in the body. Exposure to these factors during sensitive periods can affect the brain and biological development. These effects can continue throughout life and impact the risk for diseases or disorders in adulthood.

Future studies should continue to look at long-term effects of prenatal alcohol exposure. They should also investigate the mechanisms that might underlie these effects.

About the Researchers

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Prenatal alcohol (ethanol) exposure, Stress, Adjuvant-induced arthritis

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